measures, bleeding and vasodilators, seem to do good. Probably in these the hypertension was pre-existent, and the intracranial pressure not much increased in the posterior fossa. That a differentiation is possible clinically between the hypertension indicating beginning anemia of the medulla oblongata and the hypertension which helped produce the arterial rupture, I do not believe, unless previous records of the case are at hand. The former must, under no circumstances, be interfered with.

Attacks of œdema of the lungs, always of great danger and most agonizing to the patient, do not admit of simple explanation or routine treatment. Unquestionably sudden weakness of the left ventricle[13] is a large factor in their production in the patients we are considering. Such an occurrence calls at least for the simultaneous use of rapid heart-muscle stimulants, and of vasodilators to reduce to a minimum the demands on the left ventricle.

In a certain number of patients in whom severe abdominal pains or intense headache was a prominent symptom, I have been struck by the beneficial effect of morphine, both on the general condition and on the blood-pressure. The removal of the reflex vasoconstriction, which pain produces, may explain it; but this factor alone has not always seemed to me adequate to account for the remarkable and sustained improvement in a few cases of this class.

In closing I would emphasize one point strongly. The height of the blood pressure gives no indications whatever for treatment, except along preventive lines. Hypertension is no more to be attacked therapeutically than is a heart-murmur. Only those symptoms which point unmistakably to inadequate maintenance of the circulation, or to sudden threatening of danger, give us the signal to interfere.

INORGANIC LATE-SYSTOLIC PULMONARY MURMURS IN INFANCY AND CHILDHOOD.[1]

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Two years ago at the meeting of the American Medical Association we presented to the Section on Pediatrics a paper on inorganic late-systolic pulmonary murmurs in children. We were stimulated to do this because our observations were not in accord with the generally expressed views in the literature relating to this subject, and especially because of the almost universal statement in the text-books on pediatrics that functional cardiac murmurs are extremely rare in children under four years of age, some authors even denying their existence.

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[13] Cohnheim and Welch, Cohnheim's Gesam. Abhandl., Berlin, 1885, p. 593.

[1] Read at the meeting of the American Pediatric Society, 1906.

In so far as we have observed, the views expressed in the text-books have not changed, and, therefore, we have decided to offer a paper on the same subject to this Society in order to elicit the views of its members as to the frequency of functional cardiac murmurs, the nature of their origin, and their significance. It seems to us that the question is one of great importance, on account of its relationship to the subject of organic disease of the heart, and one concerning which this Society might do well to express an official opinion.

We do not presume to offer anything new, but wish merely to reiterate our impressions as to the frequency of this murmur and our interpretation of its meaning. We have little doubt that it is commonly recognized by pediatrists, but we feel that the text-books, which serve as a medium for educating the profession at large, should be correct in their statements regarding it. Speaking from experience, we are inclined to believe that the average practitioner not only considers this murmur very infrequent, but constantly mistakes it for an indication of organic disease.

From the descriptions in the literature we feel justified in assuming that all murmurs described as functional, inorganic, or anemic, being systolic in time and having their point of maximum intensity in the pulmonary area, are identical with the murmur which we are discussing. The cardiopulmonary and the diastolic functional murmurs and the functional regurgitations, especially the two former, we have found extremely uncommon in early life, and we do not believe that they should ever be confounded with the murmur to which we refer.

It seems a somewhat curious fact that a number of the French and German writers consider the cardiopulmonary murmurs quite common in infancy and early childhood, and that some of them evidently confound them with the type of murmur under discussion. It is especially interesting to note that Hochsinger, who makes such positive statements regarding the so-called "anemic murmurs," is at the same time of the opinion that the cardiopulmonary murmurs, whilst very frequent after the second year, are nevertheless observed during the first year and that this murmur "is a frequent phenomenon in infancy."

There is evidently a diversity of opinion as to what constitutes a cardiopulmonary murmur. The impression we have gained of this murmur is that it is distinctly systolic in time; that it is heard with maximum intensity at the apex and along the left border of the heart; that it has a tendency to greater transmission to the left;

that it is short and whiff-like in character and lacks the soft, prolonged, blowing sound of the late systolic murmur heard in the pulmonary area. The murmur further differs in that it is heard most distinctly toward the end of inspiration, and in that it often disappears entirely at the end of the forced expiration, especially when the patient is recumbent.

Characteristics of the Late-systolic Pulmonary Murmur. The murmur we wish to describe does not occur with the first sound; the first sound is always distinctly audible and the murmur is superadded, as it were, sometimes with a definite interval of silence, and is not uncommonly, especially when it is not loud, mesosystolic in time. This is one of the principal characteristics of the murmur, and unless one studies the systolic interval carefully the soft indistinct forms will be readily overlooked.

This murmur is ordinarily soft-blowing in character; moderately high-pitched; occasionally almost musical, and more rarely low-pitched and rather rough. It varies in duration, sometimes occupying the greater part of the systolic interval, but more frequently its early portion.

Its point of maximum intensity is most often the second left interspace close to the sternal border. It is sometimes best heard a little more to the left and quite frequently over the third costal cartilage; it sometimes has a second point of increased intensity, especially when the patient is examined in the sitting or standing posture, within and above the apex, about midway between the midclavicular and parasternal lines in the third or fourth spaces, depending upon the position of the apex.

The *position of the patient*, the *respiratory act*, and *exercise* have a striking influence upon this murmur. It is always greatly increased in the recumbent posture and frequently heard only when the patient is recumbent; it should never be considered absent unless the patient has been examined in the recumbent, as well as the upright, position. It is best heard at the end of the expiration and sometimes only heard when the breath is held at the end of a forced expiration. It will often disappear when the lungs are filled with air. *Exercise* exaggerates it. It is not uncommon to have the milder murmurs entirely disappear after the patient has remained recumbent for a time, to return again after the patient engages in some mild exercise.

There is great diversity of opinion as to the character of the second pulmonic sound associated with this murmur. In our experience, it has been invariably accentuated, and we do not, therefore, place any dependence upon the character of the second sound as an aid in the differentiation between this and organic murmurs of the heart.

Ordinarily, the murmur is not transmitted over a very wide area. It is occasionally audible only over the second interspace, but more commonly also over the third and fourth spaces, in or within the parasternal line, just above and within the apex of the heart, and, when it is very loud, it may be heard over the body of the sternum, at the apex-beat, and occasionally even beyond it. Sometimes a murmur similar in time and quality may be heard in the aortic area, but whether this murmur is the same murmur transmitted, or whether it is a different murmur produced by the existence of similar conditions in the aorta, we have not been able definitely to determine. When the murmur is audible over this wide area, it always continues to have its point of maximum intensity in the second left interspace.

The *position of the apex-beat of the heart* is not altered and the *area of heart dulness* is not increased.

There is almost invariably associated with this murmur a loud venous hum over both sides of the neck, commonly audible also below the sternal ends of the clavicles, sometimes over the manubrium of the sternum, and less frequently in the aortic area. In addition to the venous hum, one can quite frequently hear systolic blowing murmurs over the carotid and subclavian arteries.

The *relationship of anemia to this murmur* has been freely discussed in the literature and there exists a great diversity of opinion regarding it. We do not believe that anemia *per se* is responsible for its production, but, unquestionably, the conditions giving rise to the murmur are frequently associated with anemia.

In the series of eighty cases herein reported, we have determined the hemoglobin content by means of the Dare apparatus in all but eight. In three instances, the hemoglobin content was below 60 per cent. There were twenty-three which showed no functional murmurs. The hemoglobin content in these cases was respectively: 65, 70 twice; 71, 75, 78, 79, 80 five times; 81, 83 twice; 88 three times; 89, 90 twice; 92 and 94; whilst in those showing the murmur, there were found such percentages as 80 twice; 83, 85 five times, 87, 88, 90 twice; 92 and 100. There were, however, among these latter, a number of cases showing lower hemoglobin content, as many as 11 having less than 70 per cent. It will be seen from these figures that in very few instances was there a marked degree of anemia, and in one case the murmur was present when the hemoglobin content was 100. Quite often we have failed to find these murmurs present in infants suffering from severe forms of anemia.

We are unable to offer a new theory for the cause of these murmurs. The number appearing in the literature would seem pretty effectually to cover the possible modes of production. There is practically no abnormal condition concerning which more speculation has been indulged in. We have been impressed by the apt description which Balfour gives of the pulmonary area when he refers to it as the "region of romance." We will not discuss all of the theories which have been advanced, but limit ourselves to the consideration of those which seem more or less plausible.

We wish, first of all, to cite the view expressed by Leube. He believes the point of production of these murmurs to be at the base of the heart, in the beginning of the great vessels, especially the pulmonary artery, the point at which they are most distinctly heard. He says: "The wall of the pulmonary artery, being in an atonic condition, dilates more markedly in the systolic pressing in of the blood than under normal circumstances; by this dilatation of the beginning of the pulmonary artery, isochronous with the systole, there are created all of the conditions necessary for the production of the murmur." According to this conception, the time of the murmur would coincide with the time of expulsion of the systole. This represents the second part of the systole and corresponds to the first part of the descending line of the cardiogram, and, therefore, the slight sound which is formed during the systolic closure may be heard for a brief period besides the murmur; that is, it introduces the latter.

R. Geigel's explanation of this murmur is that it is produced by a relatively high ventricular pressure and an abnormally low pressure in the aortic and pulmonary arteries, which prevents the closure of the semilunar valves during the so-called closure period, giving rise to the production of a murmur at the base of the heart, the area of physiological stenosis. Leube is inclined to believe that murmurs sometimes occur in the aortic and pulmonary areas which occupy the entire period of the systole and which can be explained on the basis of Geigel's theory, but that this is not satisfactory for the explanation of the systolic murmur in which the sound of the systolic closure is audible.

Cabot accepts as the most plausible explanation that, as regards most functional murmurs, they are due to a temporary or permanent dilatation of the conus arteriosus or to pressure or suction exerted upon the overlapping lung margins by the cardiac contractions.

Fagge explains them thus: The basis of the two main arteries are supposed to be unable to retreat in correspondence with the diminished volume of the blood in anemia to the same extent as the orifices through which the blood enters them, in consquence of which vibrations occur in the current.

Drummond believes the murmur to be "the result of vibrations generated in the conus arteriosus of the right ventricle, at least in the cases in which its maximum occupies the second and third interspaces close to the sternum on the left side."

Clifford Allbutt "leans to the belief that the solution of the causation of this murmur will be found in some altered relation between the blood and the walls of the vessels, especially the pulmonary artery and conus arteriosus, so that an excessive vibration of the walls takes place."

Rudolf thinks the murmur is caused by the pulmonary artery becoming dilated whilst the orifice remains normal, the blood then being split up into fluid veins as it passes from the ventricle into the vessel. He does not believe that the dilated conus arteriosus can of itself produce a murmur, but that the pulmonary artery must be dilated at the same time. Otherwise, one merely has a cavity opening into a cylinder which will not give rise to a murmur.

Nixon explains the mechanism of production of murmurs, only audible when the patient is recumbent in those who are not obviously anemic, as due to a diminution of tension in the artery, which allows a twist or contraction to be formed at its root during the ventricular contraction. In this event, the disappearance of the murmur when the erect position is assumed would be explained by the traction made upon the pulmonary artery by the weight of the heart tending to preserve the natural caliber of the vessel.

La Salle has noted that the administration of trinitrin and other vasodilators tends to augment functional murmurs, which corroborates the view that lowered arterial tension plays a large part in their production.

We quote Foxwell's explanation at some length because it seems to combine the views before mentioned and to interpret them in a very rational manner. He says: "We may consider the whole right ventricle as one-half of a cone, which has been described from apex to base. The stout septum ventriculorum forms the triangular surface of the section, and, as the left ventricle does not fail, no more does this septum; hence, we may look upon the ventricle as a triangular board to which is attached a semicircular convexity of rubber. It is evident that this yielding rubber will stretch most where it is least restrained by the rigid triangle, namely, along the semicircular border of its base. Also, that the portion of this border which will stretch most will be the conus, for the lowest part is held in check by the unyielding rigidly fixed inferior vena cava and the middle portion by the chordæ tendinæ of the tricuspid valve and their stout musculi. Further, the direction of the blood current is from the apex toward the pulmonary valves; the conus will tend to give, therefore, most in the direction where it is longest distended with blood.

"Given this dilatation of the conus, that of the pulmonary artery is easily explained. The dilating conus carries the valves upward and this shortens the length between the two extremities of the artery. The artery becomes lax and when distended with blood enlarges in its transverse diameter, so that its wall may occupy the same superficial area. Finally, we must remember the easy distensibility of the pulmonary artery, which is proportionately, after due allowance is made for the different tensions at which they work, some six times that of the aorta."

This explanation appeals to us as one of the most rational given and in a way accounts for the relatively greater frequency of these murmurs in early life. We know that the arterial tension is lower in children than in adults, and it seems reasonable to suppose, therefore, that conditions having a tendency to depress the arterial tension would make a more rapid and profound impression upon the circulation in early life and that there would, therefore, result a greater tendency to dilatability of the great vessels. Aside from this, it is not unlikely that the higher position of the diaphragm in early life, dependent upon the relatively large liver, the tendency to distention of the abdominal organs, and the undeveloped condition of the lungs, by maintaining the heart in a high position, relieve the tension on the pulmonary artery, to some extent "shorten the length between the two extremities of the aorta," thus rendering it more dilatable.

That the murmur is produced more frequently in the pulmonary artery than in the aorta is probably explained by the fact that the walls of the pulmonary artery are normally thinner and therefore more dilatable than those of the aorta, and by the fact that the resistance to the flow of the blood expressed from the heart is greater and more proximate in the pulmonary artery than in the aorta.

Frequency of Functional Cardiac Murmurs. Of the American text-books, Holt's is the only one which seems to appreciate the frequency of the existence of these murmurs, and we feel that the statements in his work do not do full justice to this phase of the subject. He says: "Accidental murmurs may be due to anemia and other blood conditions and, although not so common as in older patients, they are by no means rare even in infants." He further states that anemic heart murmurs are frequently heard in marasmus.

Koplik quotes Hochsinger as not having found a single anemic cardiac murmur in an examination of two hundred anemic children under four years of age. He states that he has, under exceptional anemic conditions, found a mild, blowing, basic murmur and that one such murmur occurred in a child under four years. He considers the "hemic murmurs" so common in the febrile conditions of adult life as "rarely heard, even in severe febrile affections with anemia in patients under three years." He has, however, heard them in children under three years of age with severe typhoid fever.

Rotch, in referring to this matter, says: "It is rare to meet functional cardiac disturbances before the middle period of childhood, but they increase in frequency as puberty approaches." He includes the inorganic murmurs in this statement. In the paragraph on the symptomatology of anemia infantum pseudoleukemica of von Jaksch, he says "there are often a venous bruit in the neck and functional cardiac murmurs."

Jacobi, in his text-book, says: "The functional murmurs are not so frequent in the child or adolescent as in the adult." In an article appearing in the *Transactions of the American Climatological Association* for 1900, he refers to a systolic murmur which he noted in an infant, aged thirteen months, suffering from an attack of pneumonia, which disappeared during convalescence. A fatal suppurative pleurisy following the pneumonia permitted a postmortem study of the heart and absolutely nothing abnormal was found in the organ. This he considered a functional mitral murmur.

Keating refers to functional murmurs in early life as "not uncommon."

Caille, in his text-book on *Differential Diagnosis and Treatment of Disease,* says: In children accidental murmurs are comparatively rare.

Cotton makes no reference to the frequency of inorganic murmurs. He says: "The soft, systolic bruit common to infectious fevers, the cardiorespiratory murmur of vesicular emphysema, and the before-mentioned sounds due to anemia and transient incompetency are all encountered in childhood."

Meigs and Pepper considered a certain percentage of the systolic murmurs heard over the body of the heart in chorea, functional in character and dependent upon the associated anemia.

Ruhräh makes the statement that hemic and functional murmurs are frequently heard in anemia and febrile diseases and are often mistaken for organic heart disease.

Churchill in discussing a paper by Butler read before one of the Chicago Medical Societies made the following statement: "At a recent Congress, Soltmann and Hochsinger said that 'hemic murmurs' in children under four years of age were extremely rare and that they were rare even up to eight years. If this statement be true, then there must be a deplorably large amount of organic heart trouble in children."

Morse in discussing the paper which we read before the American Medical Association made the statement that "functional murmurs are very common in infants."

The foregoing quotations represent the only printed statements made by past or present members of the American Pediatric Society, relative to this subject, which we have been able to find.

A few other American authors refer to the subject thus: Taylor and Wells say that the functional or accidental murmurs in childhood, particularly in older children, are of fairly common occurrence. Oppenheim believes that murmurs in children under two and one-half years of age are almost always congenital in origin, and that hemic murmurs are much more likely to occur in young children than those of organic disease.

The opinions expressed in the foreign text-books are very similar to those above quoted. The writers of German text-books seem to have been influenced by the statements of Hochsinger and Soltmann, both of whom, a few years ago, expressed the opinion that functional murmurs are extremely uncommon during the first three years of life and that they are not observed frequently until after the seventh or eighth year. Hochsinger even went so far as to state that all systolic murmurs heard over the precordium in children under four years of age should be considered organic murmurs.

Frühwald considers them rare in childhood, particularly during the first four years.

Graetzer considers them rare up to the seventh year of age and of very rare occurrence in children under four years of age, but admits their occasional existence even in nurslings. Baginsky makes no special reference to functional murmurs. In a section on anemia, he says: "Venous murmurs are audible in many cases, especially in later childhood."

Henoch believes the accidental cardiac murmurs very rare under four years of age.

R. Hecker and J. Trumpp embody the views of Hochsinger that "the so-called accidental inorganic heart murmurs in children under four years of age are of the greatest infrequency, and a systolic heart murmur with almost positive certainty proves the existence of an organic heart affection, even if it exists as the only provable heart symptom."

Filatou says that "anemic murmurs, although seldom, occur in children under three years of age."

Audeod, in his article in the *Traitê de Maladies des Enfants,* says: "One does not find cardiac murmurs in anemic infants, but in the anemias of the second infancy cardiac bruits are common."

Among the English authors of text-books on Pediatrics, Dawson Williams and Ashby and Wright make no reference to the occurrence of these murmurs.

Goodheart and Still refer to them only as associated with chorea.

Hutchinson says that "a loud murmur heard over the precordium under two years is almost certainly congenital. Hemic murmurs may, however, occur in children under two years of age."

John Thomson says: "The functional murmurs are certainly much less common in children than in adults. They do occur, however, occasionally even in young children."

Donkin considers the occurrence of "anomalous and temporary murmurs over the precordia of healthy infants frequent.

In practically all other text-books on the diseases of children which we have consulted there is either no reference made to these murmurs, or if mentioned, the frequency of their occurrence, or the age at which they are most common, is not stated.

The opinions expressed in the journal articles and theses especially devoted to the discussion of this subject are quite similar to those found in the text-books, save that there are more authors who recognize their occurrence, the frequency of their occurrence, and the fact that they are common even in early infancy.

Garrod, for instance, states that murmurs identical in character with the hemic murmur in adults are met with even in very young children. He refers to an infant aged nineteen months in which such a murmur was present.

Looft reports a series of fifteen cases, ranging in age from three months to two and one-half years, only three being more than two years of age, in which such murmurs were present.

Rudolf found functional murmurs in 60 per cent. of the inmates of the Sick Children's Hospital in Toronto, while Butler found accidental systolic murmurs in 31.6 per cent. of a series of children between the ages of seven years and puberty. Sansom refers to the existence of these murmurs in early childhood. Weill holds the same views as Hochsinger as to their frequency.

Steffen considers accidental murmurs of more common occurrence under four years of age than is ordinarily believed.

Comby has found hemic murmurs at the base of the heart and in the vessels of the neck many times in anemic rachitic children.

Marfan thinks that anemia in young infants does not produce cardiac or vascular murmurs as frequently as in the adult, and he believes them very exceptional before the age of three years. He reports a case occurring in a boy, aged twenty-eight months, with symptoms of cardiac disease. The murmur was soft and systolic in time. The patient died and nothing abnormal was found in the heart.

Thiemisch reports a somewhat similar murmur in an infant aged six months. The autopsy revealed no abnormalities in the heart.

Drummond says that "cardiohemic" or "anemic" murmurs are quite common in children who are below par from any cause, especially when they are examined in the recumbent posture.

Practically all the authorities we have quoted admit the occurrence and comparative frequency in later childhood of functional murmurs of the type we describe, but we desire again to emphasize the fact that the vast majority, and especially the authors of text-books on pediatrics, consider accidental, anemic, or functional murmurs extremely uncommon prior to the fourth year.

In our former communication we had made no studies which gave us a very clear appreciation of the frequency of the inorganic late-systolic pulmonary murmur in infancy and childhood. We saw it often enough to make us realize that it is extremely common, and, in a study of a series of thirty-four consecutive cases in St. Vincent's Home, of infants ranging in age from two weeks to three and one-half years, we found it present in 21, or 61.7 per cent., distributed as follows: Eight times in nineteen children under one year of age; twelve times in fifteen children between one and three years of age; and in one child three and one-half years of age it was also present.

In order to obtain some additional evidence as to its actual frequency, we have studied forty-six children in the Southern Home for Destitute Children, ranging in age from three to ten years.

Of the five aged three years, four had the murmur; of the nine aged four years, seven; of the five aged five years, three; one of the five aged six years had an organic lesion and the four remaining had the functional murmur; five of the six aged seven years had it; three of the four aged nine years and only two of the five aged ten years.

It is seen, therefore, that of the total number (forty-six), thirty-two or 69.5 per cent. showed the presence of murmurs; and that of the fourteen under five years, eleven, or 78.5 per cent., had murmurs; while of the thirty-two between the ages of five and ten years, murmurs were present in twenty one, or 65.3 per cent.

Adding together the number of children examined consecutively in the preparation of our former paper and the forty-six examined consecutively in the preparation of this paper, we have a total of eighty of which number, fifty-three or 66.2 per cent. showed the murmur. Of these eighty children forty-eight were under five years of age, and of this number, thirty-two, or 66.2 per cent. had the murmur. Of the thirty-two remaining, all of whom were over five years of age, there were twenty-one, or 65.3 per cent., with the murmur. On the basis of these figures, therefore, it would seem that in institutional children, showing no special manifestations of disease, acute or chronic, but influenced only by their environment, between 60 and 70 per cent. have the type of murmur under discussion, and that this murmur is quite as common in children under five years of age as in later childhood. It is interesting to note also that these results correspond closely with those obtained by Rudolf, quoted above, and that the 31.6 per cent. of functional murmurs found by Butler in the examination of a series of hearts in children ranging in age from seven years to puberty would seem to support the suspicion suggested by our figures—that this murmur is more common during the first five years of life than between this age and puberty—a view which we have held for some years.

While this murmur is doubtless more common in children living in an environment such as obtains in institutions of the class we have worked in, we are, nevertheless, convinced from our experience in private practice among the better class of people that it occurs with almost equal frequency in children living under the best hygienic conditions, who have practically no evidences of anemia, and whose state of health is very slightly below the normal, and not infrequently in those who have every appearance of being perfectly well. Of course, they are much multiplied in frequency during the acute febrile conditions, or during any decided condition of ill health.

This murmur has no special clinical significance. The recognition of the frequency of its occurrence is important in order that it may be differentiated from murmurs of organic origin.

If its characteristics are fairly understood, it is not likely that it will be misinterpreted The points upon which one should lay special stress in differentiating it from organic murmurs are these:

The changes in the heart muscle found in organic disease of the heart, as indicated by displacement of the apex-beat and increase in the area of dulness, are not present. The murmur is proportionately more augmented by the recumbent posture than are the organic murmurs; it is often audible only when the patient is recumbent. It is differently influenced by respiration, being loudest at the end of expiration and the beginning of inspiration, sometimes entirely disappearing at the end of a full inspiration. The murmur invariably has its point of maximum intensity in the second left interspace close to the sternum or over the third costal cartilage. It is sometimes transmitted over practically the entire cardiac area, but rarely beyond it. It never eliminates the first sound, but exists only after the period of systolic closure; it is, in other words, late-systolic.

PAROXYSMAL IRREGULARITY OF THE HEART AND AURICULAR FIBRILLATION.

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The following case of marked irregularity of the heart occurred in the service of Dr. Peterson, professor of gynecology and obstetrics in the University of Michigan. Careful examination of the heart was made and a number of sphygmographic tracings were obtained. Unfortunately at that time we were not acquainted with Mackenzie's methods of taking the venous and liver pulses and failed to take advantage of this most valuable method of analyzing cardiac irregularity. The case is of considerable interest, however, and the light which seems to be thrown on it by our experience of irregularity in animal experiments encourages us to put it on record. The history of the case as supplied by Dr. Peterson is as follows:

Mrs. H. H., a widow, aged sixty-four years, was admitted to hospital, December 23, 1901, for ovarian fibroid. She was operated on December 24. Anesthesia (ether) for one hour and twenty minutes. Her condition was good at end of the operation; pulse 90. Nausea persisted throughout the 24th, and on 26th the patient vomiting repeatedly, but on the 27th some improvement was noted in this respect. The pulse on the 25th and 26th was 90 to 100 at